
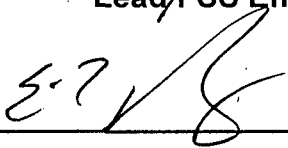


Rancho Seco
Final Status Survey Summary Report
March 20, 2008
Letdown Filter/Backwash Tank Room
Survey Unit F8130131

Prepared By: D.A.Tallman  Date: March 24, 2008
FSS Engineer

Reviewed By:  Date: 3/24/08
Lead FSS Engineer

Approved By:  Date: 5-12-08
Dismantlement Superintendent, Radiological

FINAL STATUS SURVEY SUMMARY REPORT

Survey Unit:

F8130131, Letdown Filter/Backwash Tank Room

Survey Unit Description:

Operating History: The Auxiliary Building, a reinforced concrete structure, contained the RadWaste processing and supporting systems. The building contained six main elevations. Residual radioactive material was known to be present on all levels of the interior of the building. Operating records and the HSA document several events with the potential for a release of radioactivity inside this structure.

Site Characterization: Direct measurements were made of each of the interior elevation surfaces as well as the exterior surfaces of the structure. These measurements confirmed the presence of plant-derived radionuclides. Direct measurements on the -20' elevation showed a mean gross activity level of 247,831 dpm/100 cm² and a maximum value of 10,080,000 dpm/100 cm². Based on the classification procedure (DSIP-0020) and levels of gross activity reported, the Letdown Filter/Backwash Tank Room within the interior of the auxiliary building was determined to be a Class 1 survey unit.

Survey Unit Design Information:

The Survey Unit Design Parameters are presented in Table 1 below. The survey unit and measurement locations are depicted on the maps in Attachment 1. Direct measurement locations were determined using a random-start, fixed grid pattern and 68.2 m² were scanned for 100% coverage. Samples of removable contamination were collected at each direct measurement location. The instrumentation used for the survey along with the MDC values are listed in Tables 2-1 and 2-2 in Attachment 2.

Table 1. Survey Unit Design Parameters

Survey Design Parameter	Value	Comment
Survey Area:	F813	Letdown Filter/Backwash Tank Room
Survey Unit:	0131	Structure Surface
Class:	1	LTP Table 5-4
SU Area (m²):	68.2	
Evaluator:	D.A.Tallman	
DCGL (dpm/100 cm²):	43000	Gross Activity DCGL
Area Factor:	4.8	Class 1
Design DCGL_{emc} (dpm/100 cm²):	207561	Class 1
LBGR (dpm/100 cm²):	21500	Default = 50% DCGL
Design Sigma (dpm/100 cm²):	12035	
Type I Error:	0.05	
Type II Error:	0.05	
Predominant Nuclide:	Cs-137	
Sample Area (m²):	4.26	Class 1
Scan Area (m²):	68.2	
Scan Coverage (%):	100%	Class 1
Z_{1-α}:	1.645	
Z_{1-β}:	1.645	
Sign P:	0.96407	
Calculated Relative Shift:	1.8	
Relative Shift Used:	1.8	Uses 3.0 if Relative Shift is >3
N-Value:	13	
Design N-Value + 20%:	16	NUREG-1575 Table 5-5
Design Min Samples N:	16	Class 1
Grid Spacing L:	2.0	Class 1

Survey Results:

A total of 18 direct measurements were made in F8130131. The results including mean, median, standard deviation and range are shown in Table 2. All direct measurements were less than the DCGL. One of the scan measurements indicated areas of elevated activity. Scan activity ranged from 3297 to 91179 dpm/100 cm², based on a surveyor efficiency of 0.5 and no background subtracted. Samples for removable surface activity were all less than 10% of the DCGL as shown in Table 3. Removable surface activity samples were counted for alpha activity and none was detected at the MDC shown in Table 2-1 of Attachment 2.

Table 2. Direct Measurement Results

Measurement ID	Gross Activity (dpm/100 cm ²)
F8130131-C0001BD	2173
F8130131-C0002BD	1499
F8130131-C0003BD	4596
F8130131-C0004BD	1411
F8130131-C0005BD	2090
F8130131-C0006BD	1790
F8130131-C0007BD	1696
F8130131-C0008BD	2314
F8130131-C0009BD	1935
F8130131-C0010BD	2002
F8130131-C0011BD	2225
F8130131-C0012BD	2101
F8130131-C0013BD	2137
F8130131-C0014BD	2272
F8130131-C0015BD	1878
F8130131-C0016BD	3408
F8130131-C0017BD	2308
F8130131-C0018BD	2407
Mean:	2236
Median:	2119
Standard Deviation:	729
Range:	1411 - 4596

Table 3. Removable Surface Activity Results

Measurement ID	Surface Beta Activity (dpm/100 cm ²)
F8130131C0001SM	1.64
F8130131C0002SM	6.8
F8130131C0003SM	32.63
F8130131C0004SM	18.42
F8130131C0005SM	26.17
F8130131C0006SM	-0.95
F8130131C0007SM	14.55
F8130131C0008SM	2.93
F8130131C0009SM	5.51
F8130131C0010SM	-3.53
F8130131C0011SM	0.34
F8130131C0012SM	4.22
F8130131C0013SM	4.22
F8130131C0014SM	2.93
F8130131C0015SM	-0.95
F8130131C0016SM	15.84
F8130131C0017SM	-3.53
F8130131C0018SM	1.64
Mean:	7.16
Median:	3.57
Standard Deviation:	10.26
Range:	-3.53 to 32.63

Survey Unit Data Assessment:

The survey design required 18 direct measurements for the Sign Test. The critical value and the results of the Sign Test are presented in Table 4. The sample mean and median values were less than the DCGL. The sample standard deviation was less than the design standard deviation so no additional samples were required.

Table 4. Data Assessment Results

Survey Results Parameter	Value	Comment
Material Background Used (dpm/100 cm ²):	N/A	
Ambient Background Used (dpm/100 cm ²):	N/A	Average Ambient BKG = 0
Actual Direct Measurements (N):	18	
Median (dpm/100 cm ²):	2119	
Mean (dpm/100 cm ²):	2236	
Direct Measurement Standard Deviation (dpm/100 cm ²):	729	
Total Standard Deviation (dpm/100 cm ²):	729	Based on samples and backgrounds.
Maximum (dpm/100 cm ²):	4596	
Material Type:	N/A	Background Subtract Not Applied
Sign Test Final N Value:	18	
S+ Value:	18	
Critical Value:	12	
Sufficient Samples Collected:	Yes	
Maximum Value < DCGL:	Yes	
Median Value < DCGL:	Yes	
Mean Value < DCGL:	Yes	
Maximum Value < DCGL_{mc}:	Yes	Class 1
Total Standard Deviation <= Sigma:	Yes	
Pass the Sign Test?	Yes	
Reject the Null Hypothesis?	Yes	
Does the Survey Unit Pass All Criteria?	Yes	

Survey Unit Investigations and Results:

One investigation (Penetration Scan P0011) was required and the results are reported in Attachment 3. The EMC unity rule was not exceeded as shown in Table 3-1.

ALARA Statement:

As stated in Chapter 4 of the LTP, as long as the residual activity within the survey unit is less than the DCGL (i.e. the survey unit average activity is less than the DCGL and the EMC criterion has been met), the ALARA criterion has been met.

Changes in Initial Survey Unit Assumptions:

The survey unit was designed as a Class 1 structure survey and the sample results are consistent with that classification. The variability of the survey results was less than characterization data used for survey design. One potential area of elevated activity was detected and evaluated as shown in Attachment 3 demonstrating that the EMC criterion was met.

Conclusion:

The FSS of this survey unit was properly designed as a Class 1 survey based on Table 5-4 of the LTP. The required number of direct measurements was made and the scan coverage met the requirement of Table 5-6 of the LTP. No direct measurements exceeded the DCGL of 43000 dpm/100 cm² and none of the removable surface activity measurements exceeded 10% of the DCGL. The investigation required was performed and evaluated as shown in Attachment 3.

The direct measurement data support rejection of the null hypothesis, providing high confidence that the survey unit satisfied the release criteria and that the data quality objectives were met.

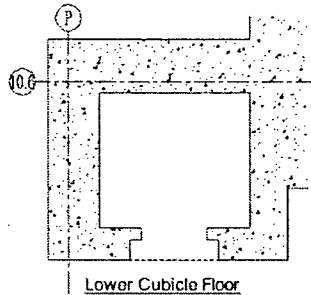
It is concluded that survey unit F8130131 meets the release criteria of 10CFR20.1402.

Attachment 1

Maps

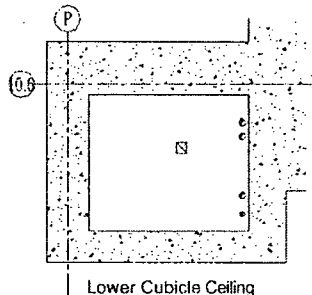
March 20, 2008

Survey Unit F8130131



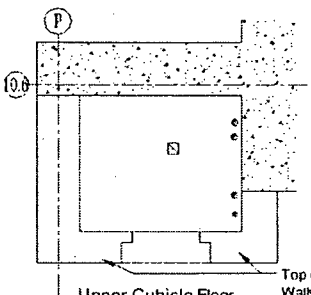
Lower Cubicle Floor

4.8 m²



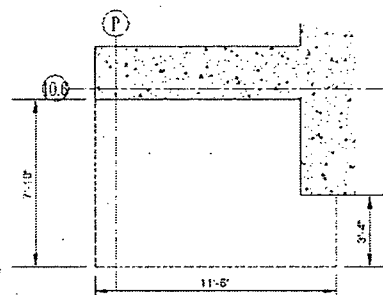
Lower Cubicle Ceiling

4.6 m²



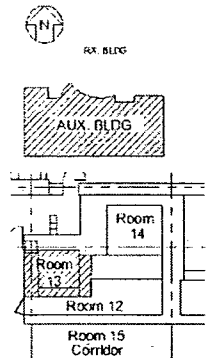
Upper Cubicle Floor
And Wall Tops

7.7 m²



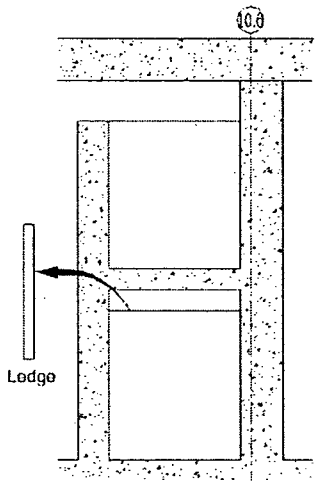
Room 13 Ceiling

7.7 m²



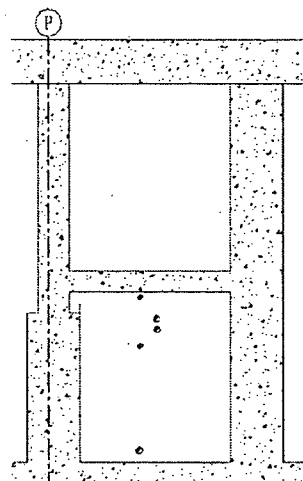
KEY PLANS

(Not To Scale)



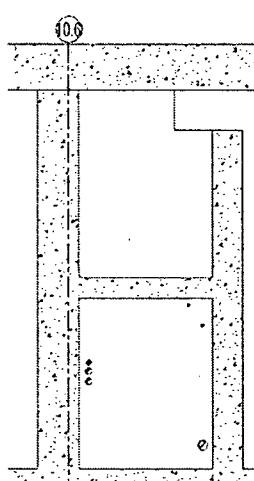
West Wall

9.2 m²



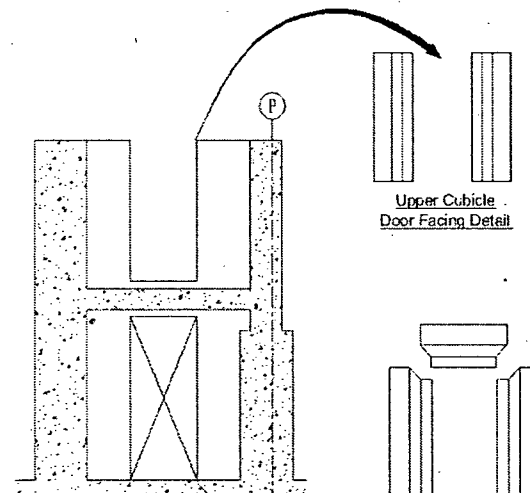
North Wall

11.9 m²



East Wall

9.7 m²

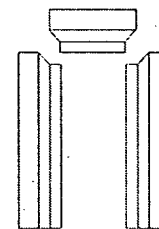


South Wall

12.6 m²

(Includes Door Facings)

Upper Cubicle
Door Facing Detail



Door Facing Detail

Ledge



SCALE METERS



SMUD

SACRAMENTO MUNICIPAL
UTILITY DISTRICT

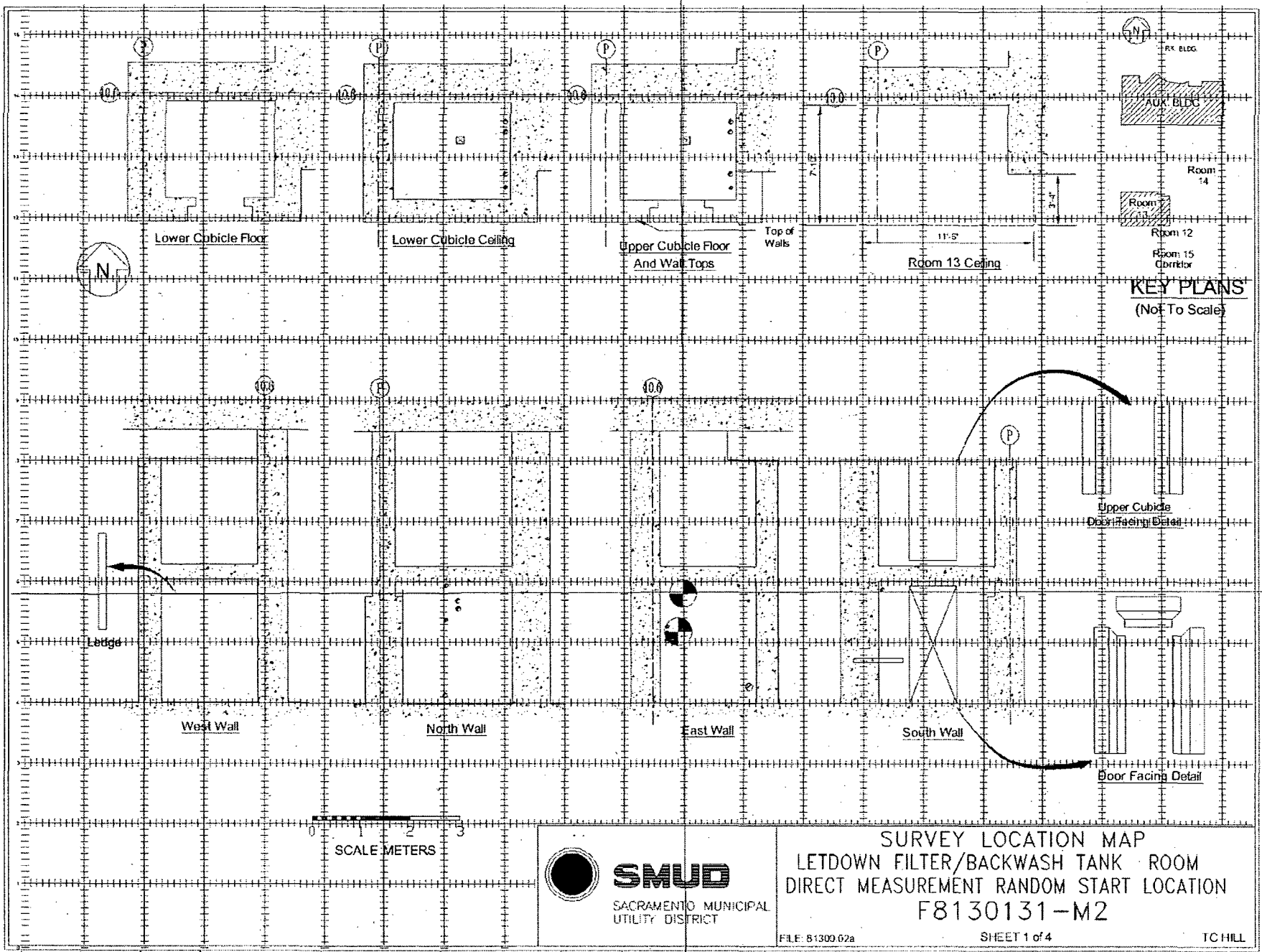
SURVEY LOCATION MAP
LETDOWN FILTER/BACKWASH TANK ROOM
SURFACE AREA ESTIMATE

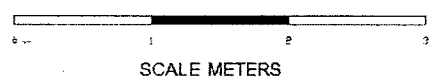
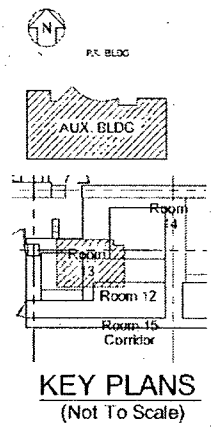
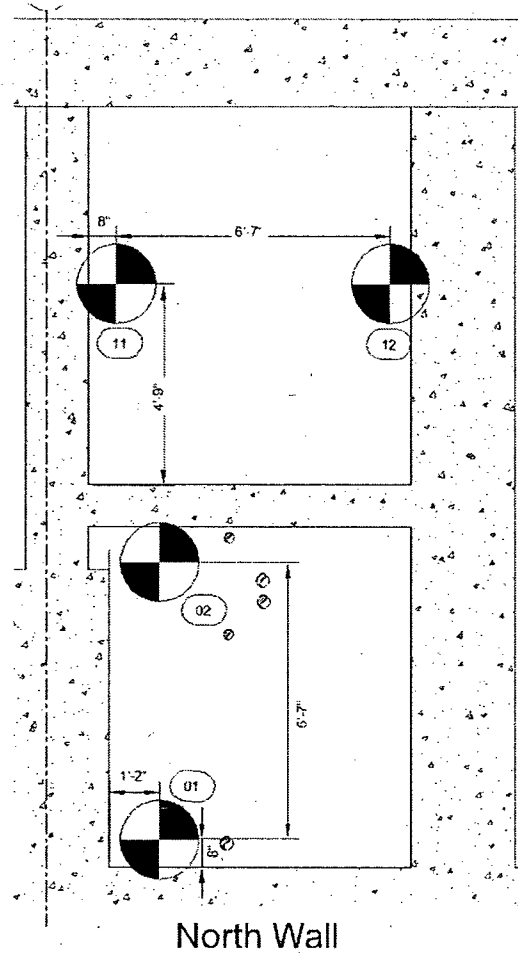
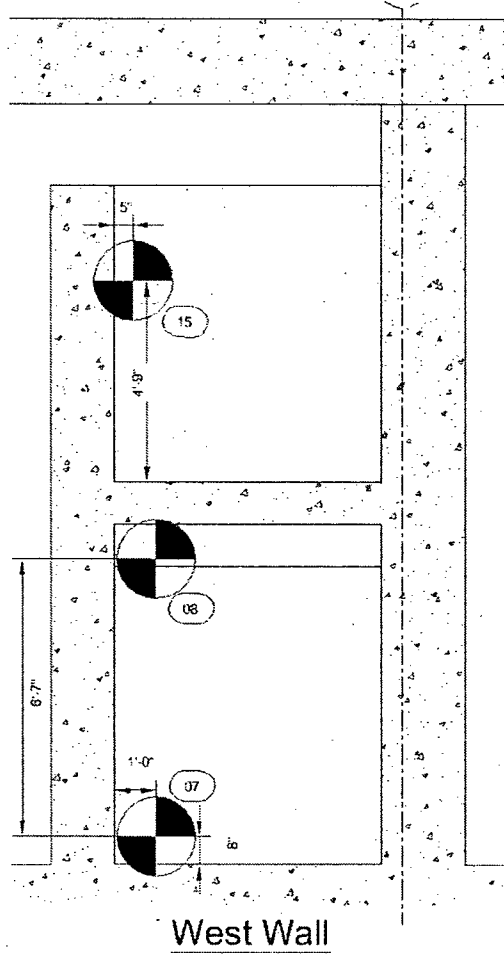
F8130131-M1

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SHEET 1 of 1

TC HILL



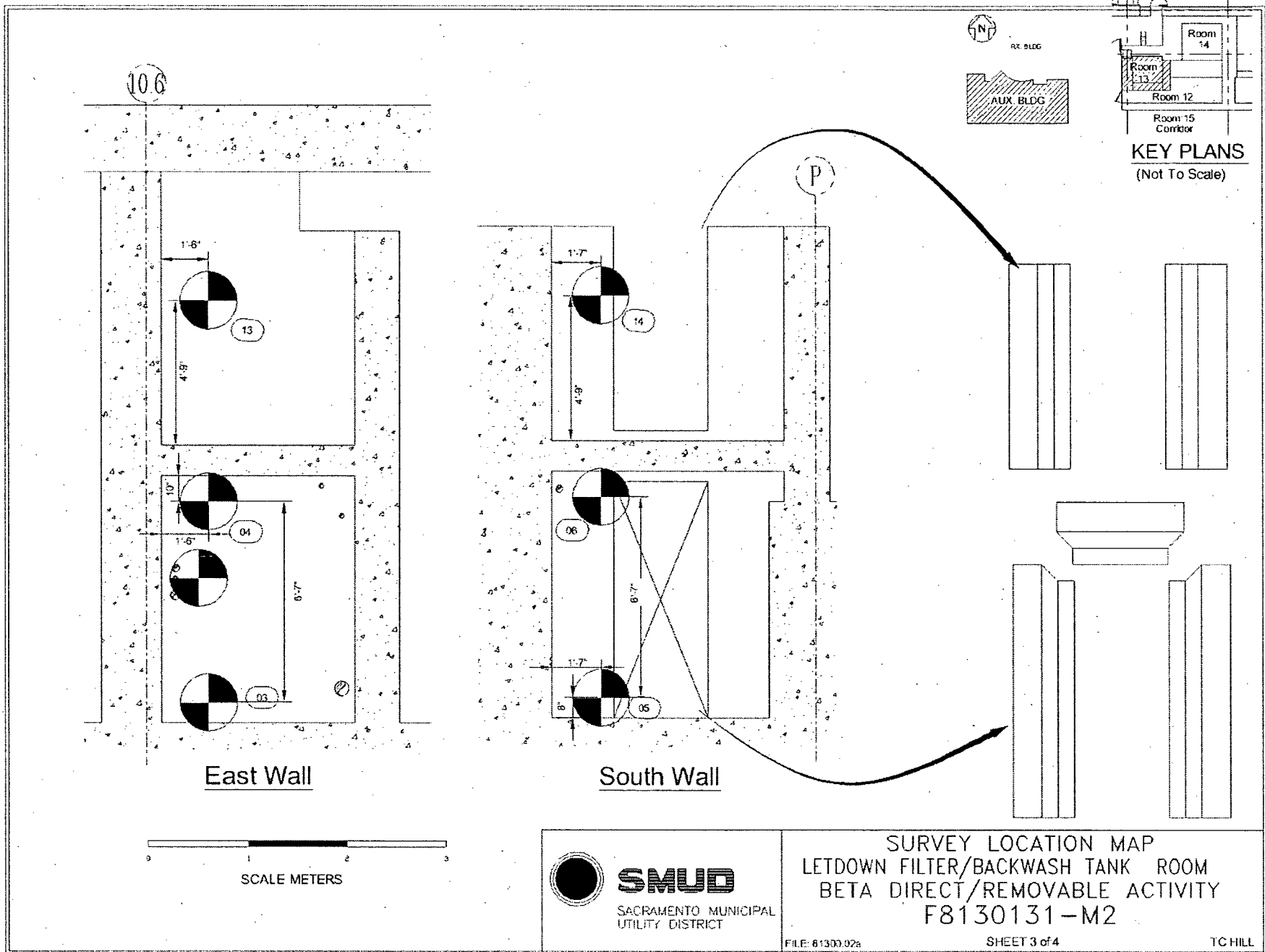


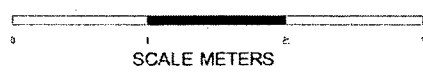
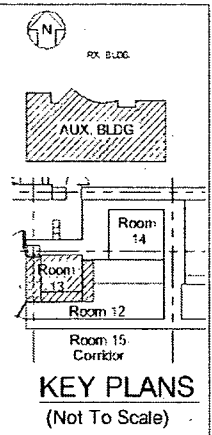
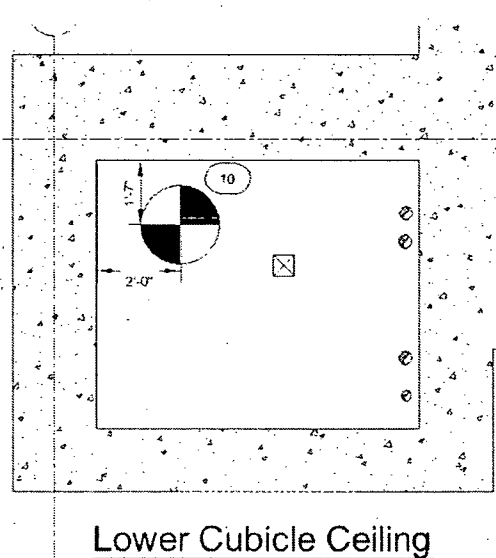
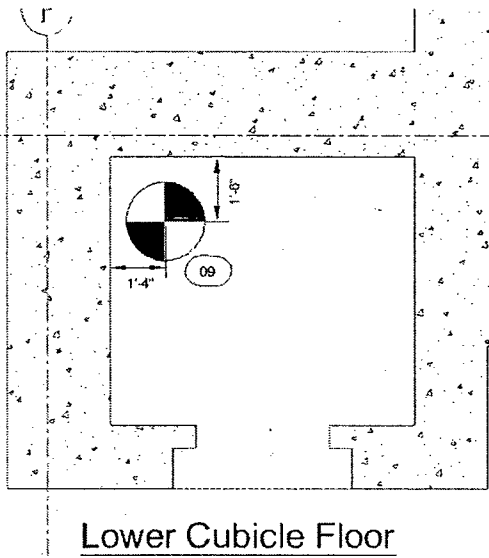
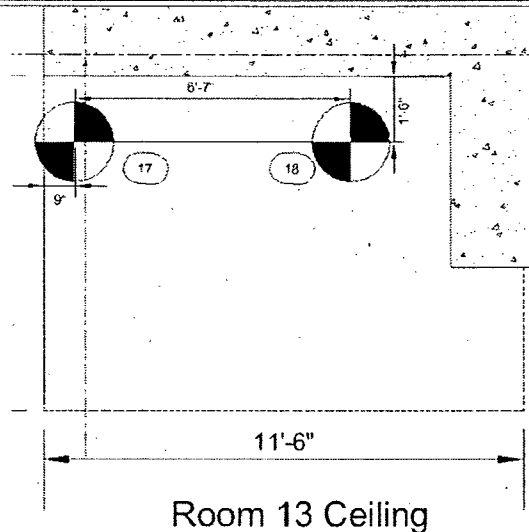
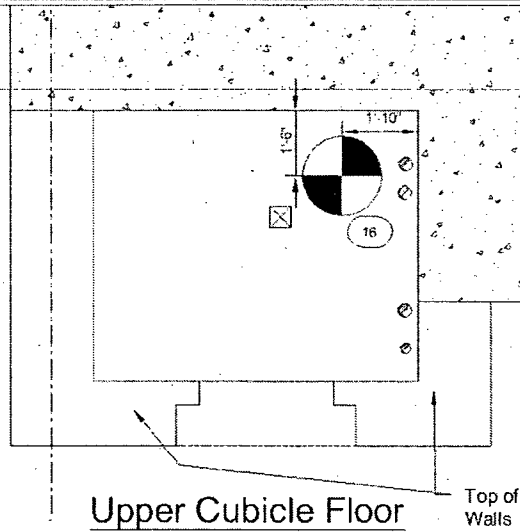
SURVEY LOCATION MAP
 LETDOWN FILTER/BACKWASH TANK ROOM
 BETA DIRECT/REMOVABLE ACTIVITY
 F8130131-M2

FILE: 81300.02a

SHEET 2 of 4

TC HILL



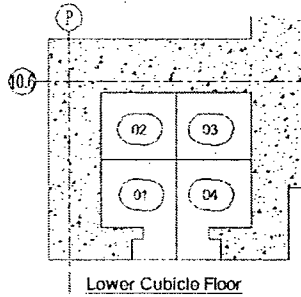


SURVEY LOCATION MAP
LETDOWN FILTER/BACKWASH TANK ROOM
BETA DIRECT/REMOVABLE ACTIVITY
F8130131-M2

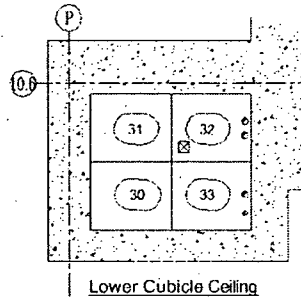
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SHEET 4 of 4

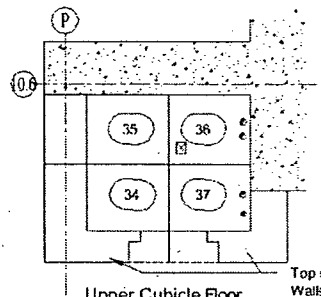
TC HILL



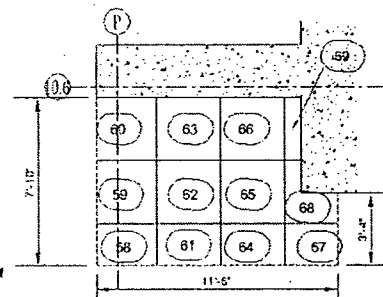
Lower Cubicle Floor
4.8 m²



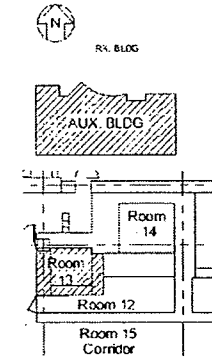
Lower Cubicle Ceiling
4.6 m²



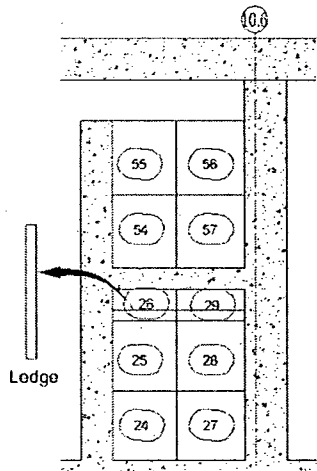
Upper Cubicle Floor
And Wall Tops
7.7 m²



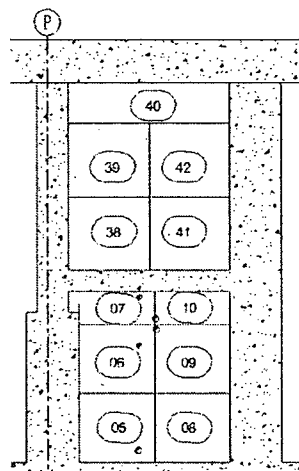
Room 13 Ceiling
7.7 m²



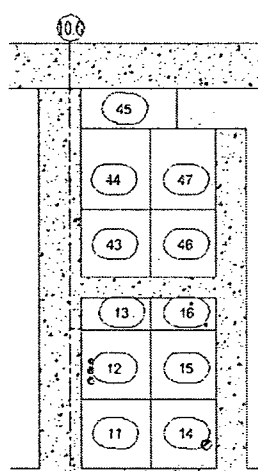
KEY PLANS
(Not To Scale)



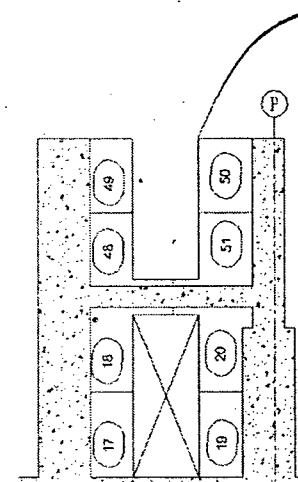
West Wall
9.2 m²



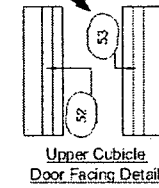
North Wall
11.9 m²



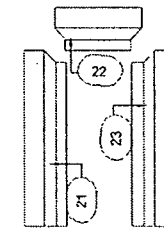
East Wall
9.7 m²



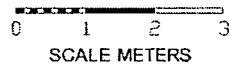
South Wall
12.6 m²
(Includes Door Facings)



Upper Cubicle
Door Facing Detail



Door Facing Detail



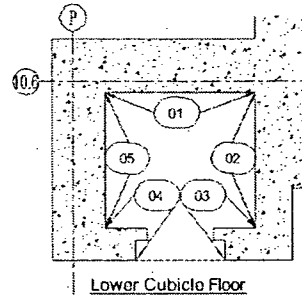
SMUD
SACRAMENTO MUNICIPAL
UTILITY DISTRICT

SURVEY LOCATION MAP
LETDOWN FILTER/BACKWASH TANK ROOM
BETA SCANS
F8130131-M3

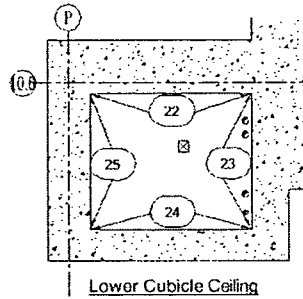
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SHEET 1 of 1

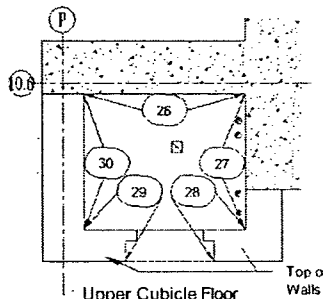
TC HILL



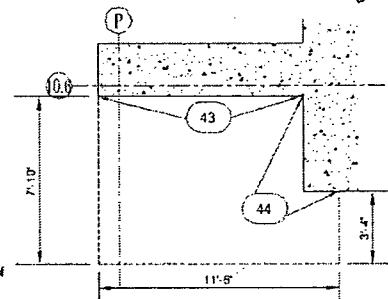
4.8 m²



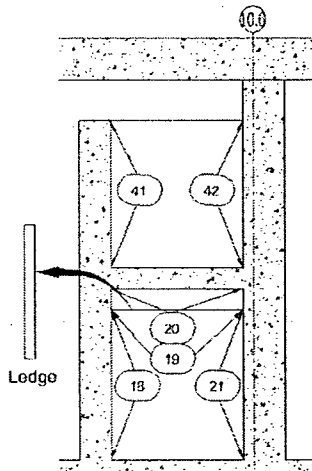
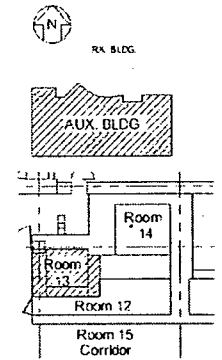
4.6 m²



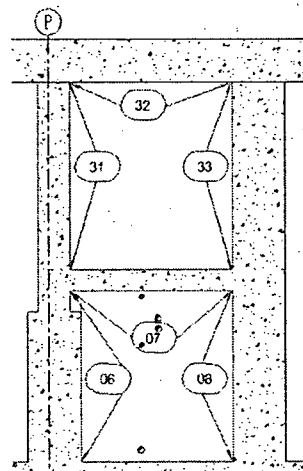
7.7 m²



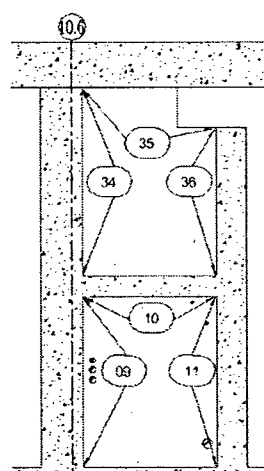
7.7 m²



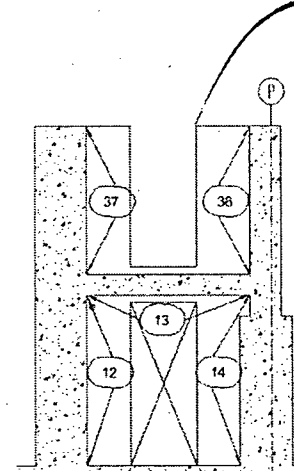
9.2 m²



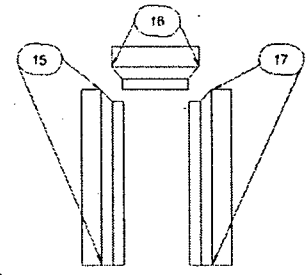
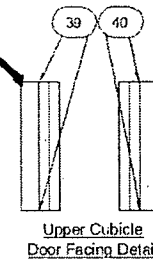
11.9 m²



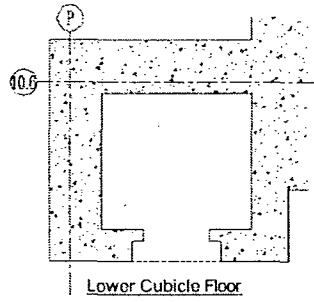
9.7 m²



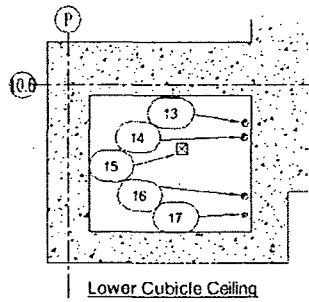
12.6 m²
(Includes Door Facings)



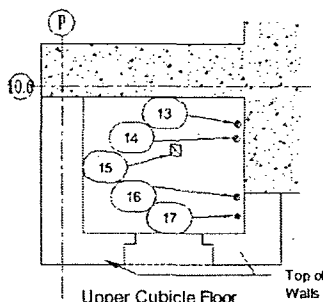
SURVEY LOCATION MAP
LETDOWN FILTER/BACKWASH TANK ROOM
JUNCTURE SCANS
F8130131-M4



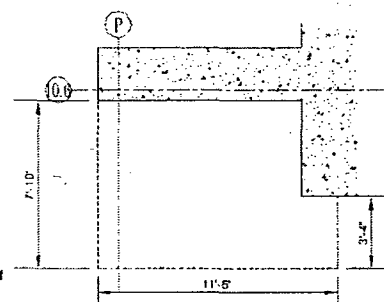
Lower Cubicle Floor
4.8 m²



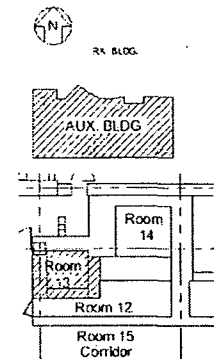
Lower Cubicle Ceiling
4.6 m²



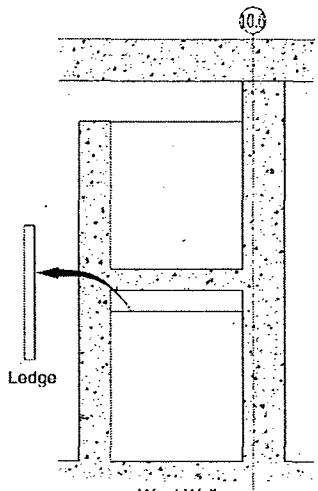
Upper Cubicle Floor
And Wall Tops
7.7 m²



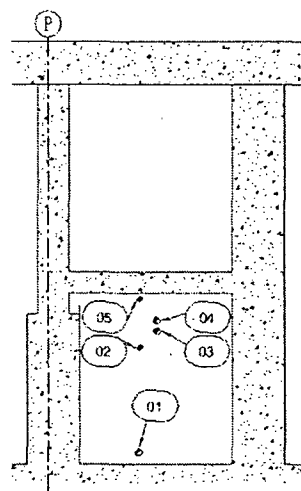
Room 13 Ceiling
7.7 m²



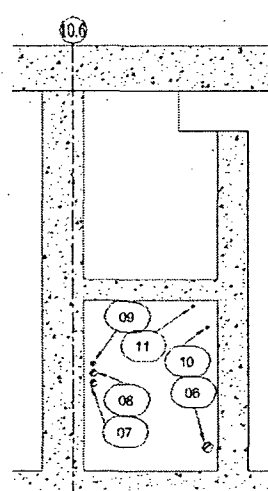
KEY PLANS
(Not To Scale)



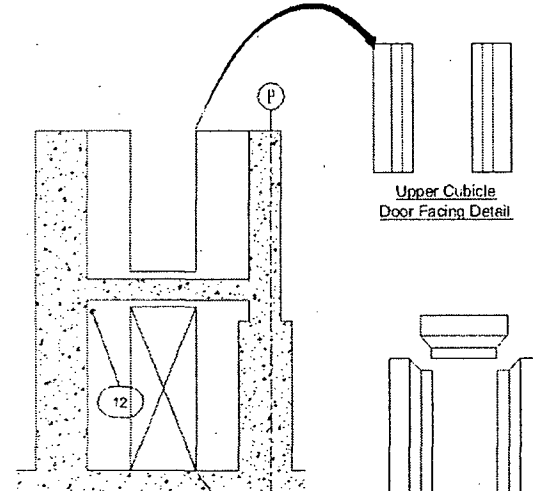
West Wall
9.2 m²



North Wall
11.9 m²

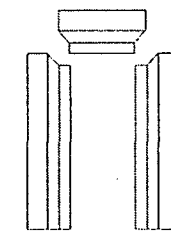


East Wall
9.7 m²



South Wall
12.6 m²
(Includes Door Facings)

Upper Cubicle
Door Facing Detail



Door Facing Detail



SURVEY LOCATION MAP
 LETDOWN FILTER/BACKWASH TANK ROOM
 PENETRATION SCANS
 F8130131-M5

Attachment 2

Instrumentation

March 20, 2008

Survey Unit F8130131

Table 2-1. Survey Unit Instrumentation

Instrument Model; Serial No.	Detector Model; Serial No.	MDC Static (dpm/100 cm²)	MDC Scan (dpm/100 cm²)
M2350; 180733	43-98B; 148638 ¹	590	1070
M2350; 180733	43-98B; 148638 ²	930	1680
M2350; 180733	43-98B; 148638 ³	1400	2520
M2350; 180733	43-98B; 148638 ⁴	550	990
M2350; 180733	43-94; 148620 ⁵	350	610
M2350; 142515	43-68B; 148453	433	1033
M2350; 180738	43-68/5B; 148942	433	1033
M2350; 193700	43-116-1B; 216072 ⁷	796	3258
M2350; 193700	43-116-1B; 216073 ⁶	491	739
M2350; 180738	43-116-1B; 216073 ⁷	796	3258
Tennelec; 0401171	N/A	5.88 dpm α , 11.71 dpm β	N/A

¹ Penetration – 2” - concrete

² Penetration – 3” - concrete

³ Penetration – 4” - concrete

⁴ Penetration – 3” – metal

⁵ Penetration – 1” – concrete

⁶ Juncture – concrete

⁷ Structure /Penetration – 4”-14” - concrete

Table 2-2. Investigation Criteria and DCGL

Parameter	Value (dpm/100 cm²)
Investigation Criteria - Direct	207561
Investigation Criteria – Scan	43000 ^A
DCGL _W	43000
DCGL _{EMC}	207561

^A Investigation Level set at DCGL_W within the survey instruction.

Attachment 3

Investigation

March 20, 2008

Survey Unit F8130131

(none required)

Table 3-1 Survey Unit Investigation

<i>Grid</i>	<i>Investigation Level (cpm)</i>	<i>Initial Value (cpm)</i>	<i>Investigation Result (cpm)</i>	<i>Elevated Area (m²)</i>	<i>Area Factor</i>	<i>DCGL_{emc}</i>	<i>Investigation Result (dpm/100cm²)</i>	<i>DCGL_{emc} Unity Fraction</i>
P0011	3180	6731	6731	0.09	146	6,281,162	91180	0.0142
Survey Unit Remainder						DCGL = 43,000	SU Mean = 2236	0.052
EMC Unity Sum								0.0662

Attachment 4

Data Assessment

March 20, 2008

Survey Unit F8130131

